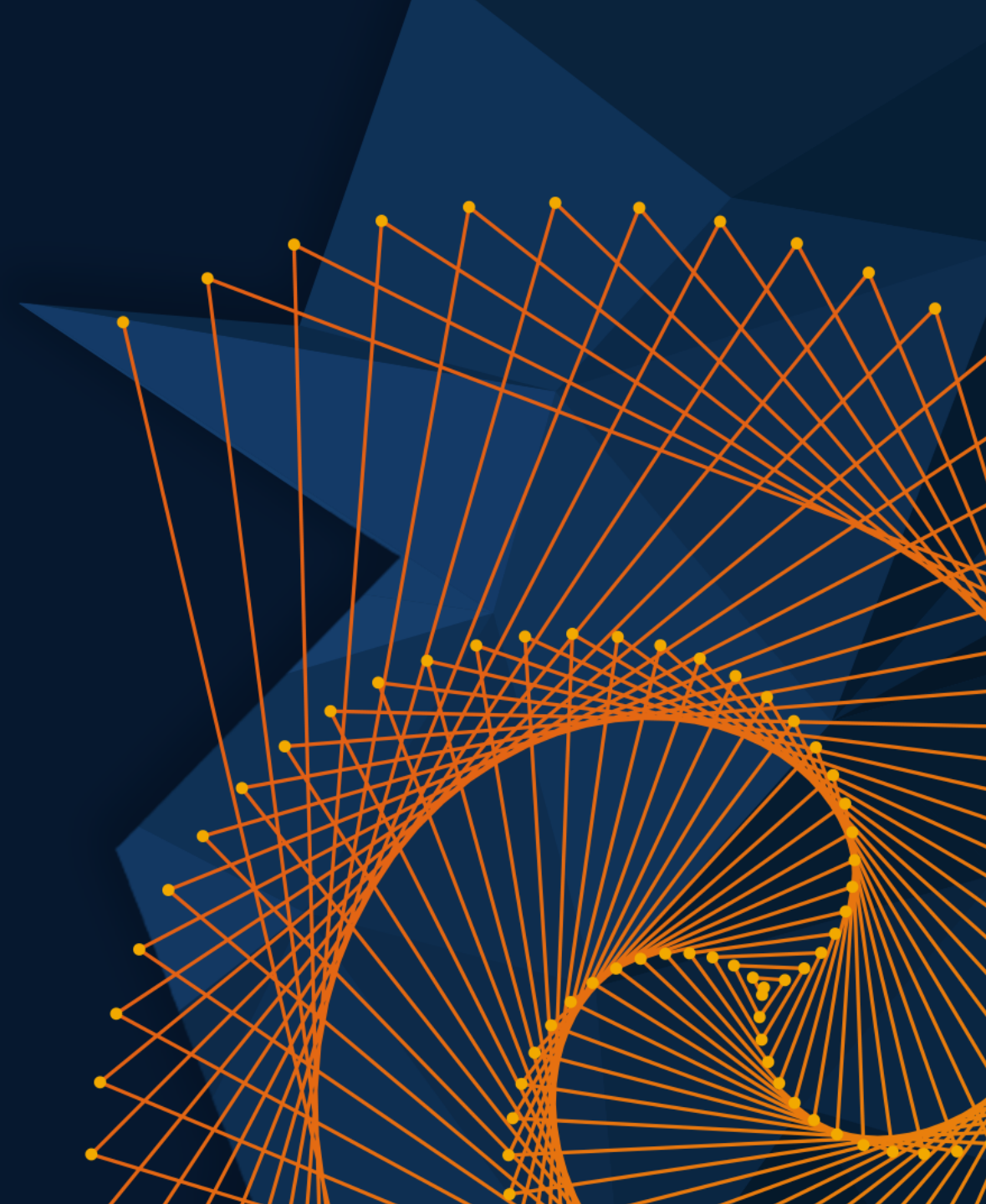


MATLAB EXPO

 UNITED KINGDOM

Engineering in the Cloud: Unlocking New Possibilities

Amélie Lamarquette, MathWorks



Cloud Trends



CI and Test

Performing Virtual Testing and Simulation in a Cloud-Based Continuous Integration Environment
AGSOTEC

Scale

Physics-Informed Machine Learning: Cloud-Based Deep Learning and Acoustic Patterning for Organ Cell Growth Research
Massachusetts Institute of Technology

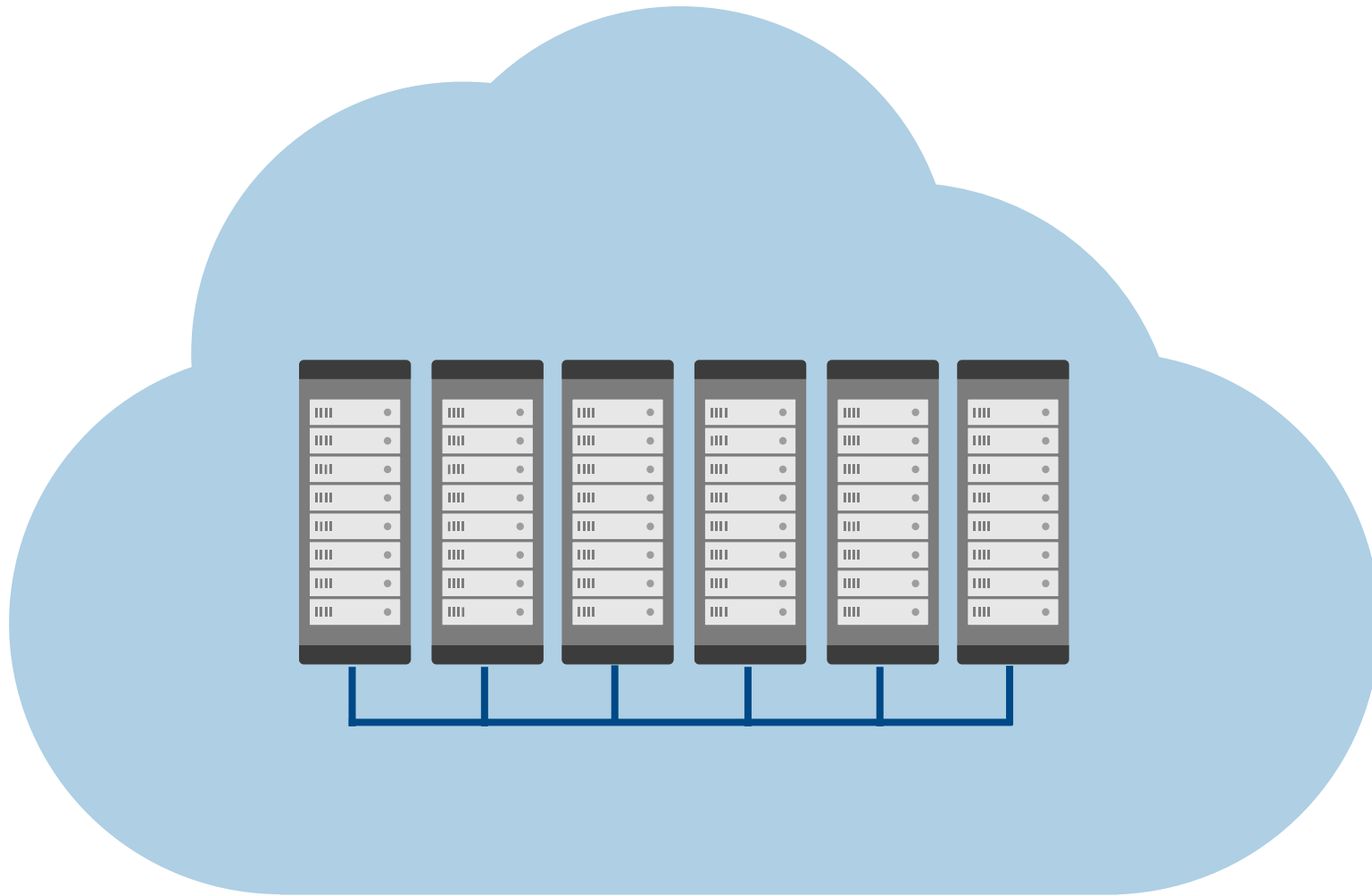
Deploy

Developing IoT Applications Using MATLAB
Skyrad

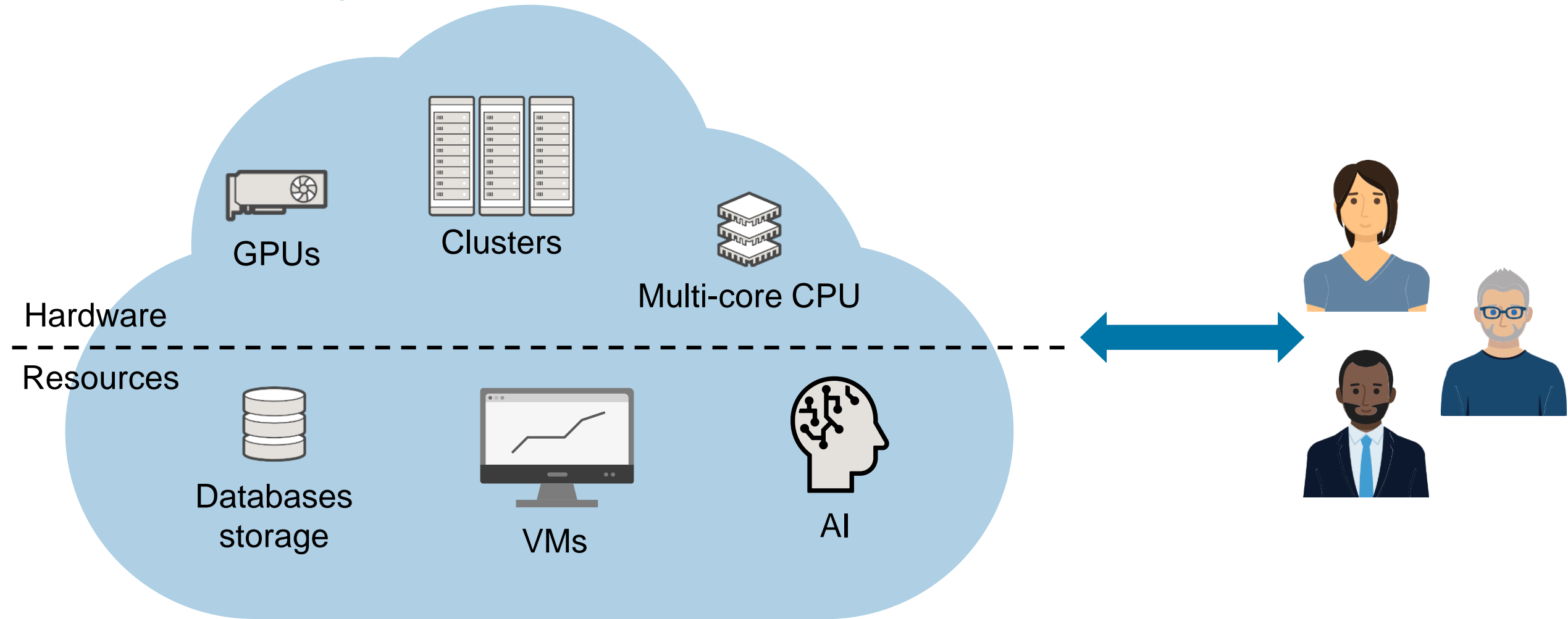
What Will You Learn Today?



What Is the Cloud?



What Is the Cloud?



What Is the Cloud?



Public cloud



Private cloud



Software as a service

MATLAB Online

MATLAB Drive

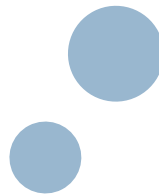
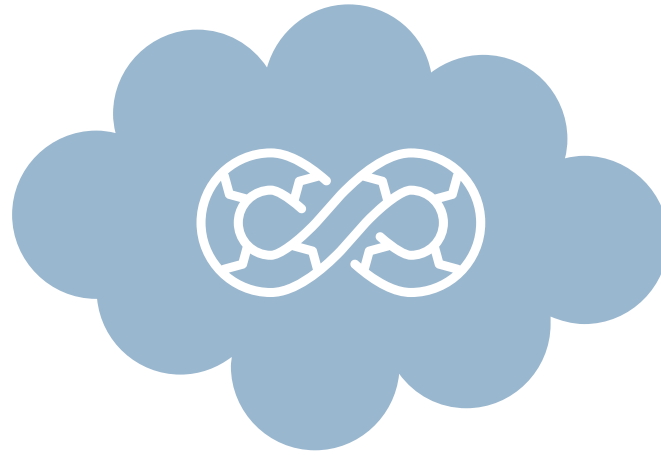
What Will You Learn Today?



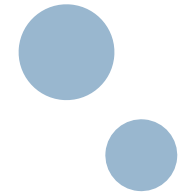
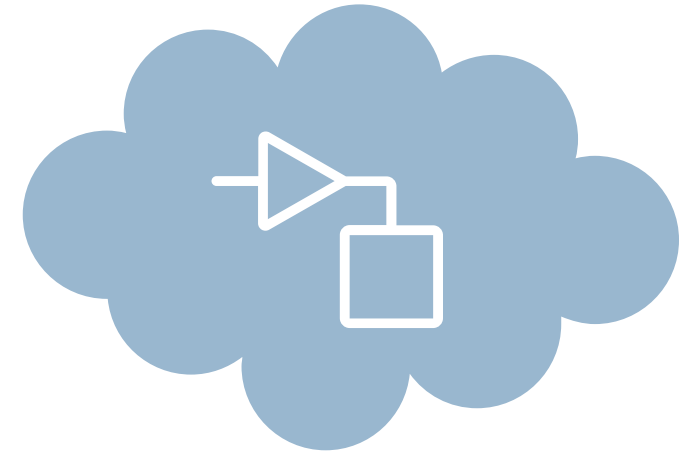
Why Should You Think about the Cloud?



Data analyst

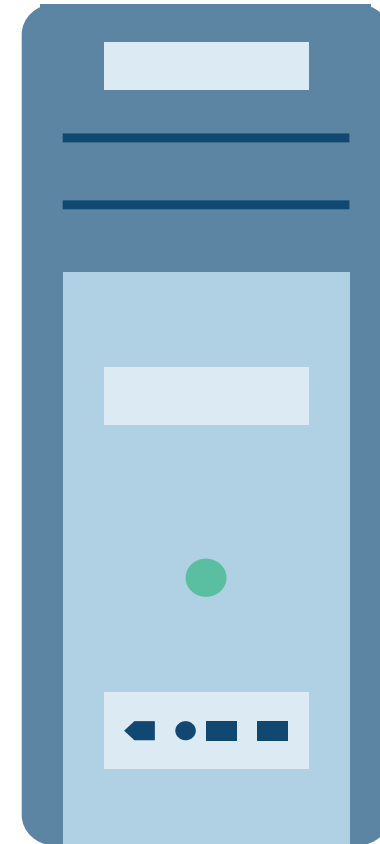
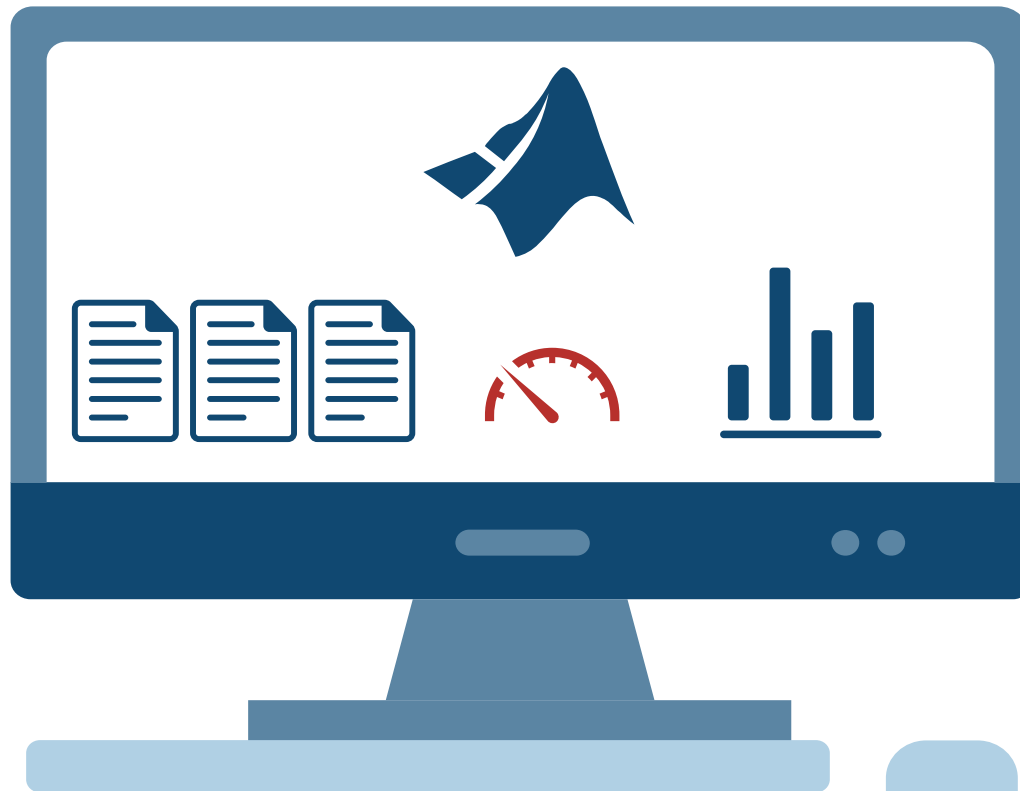


Test engineer



Simulation engineer

Current Workflows



Limited storage

Time consuming

Cloud Workflows



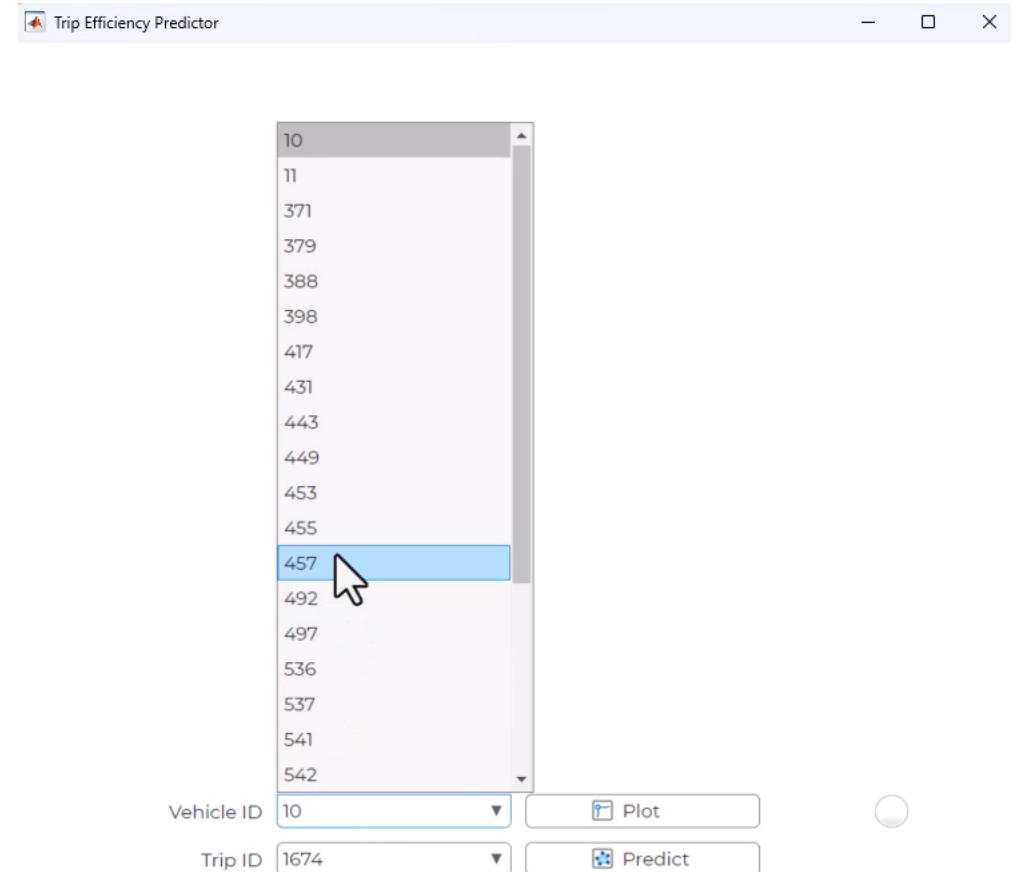
Large storage

Powerful compute

Automation

Example – Deep learning

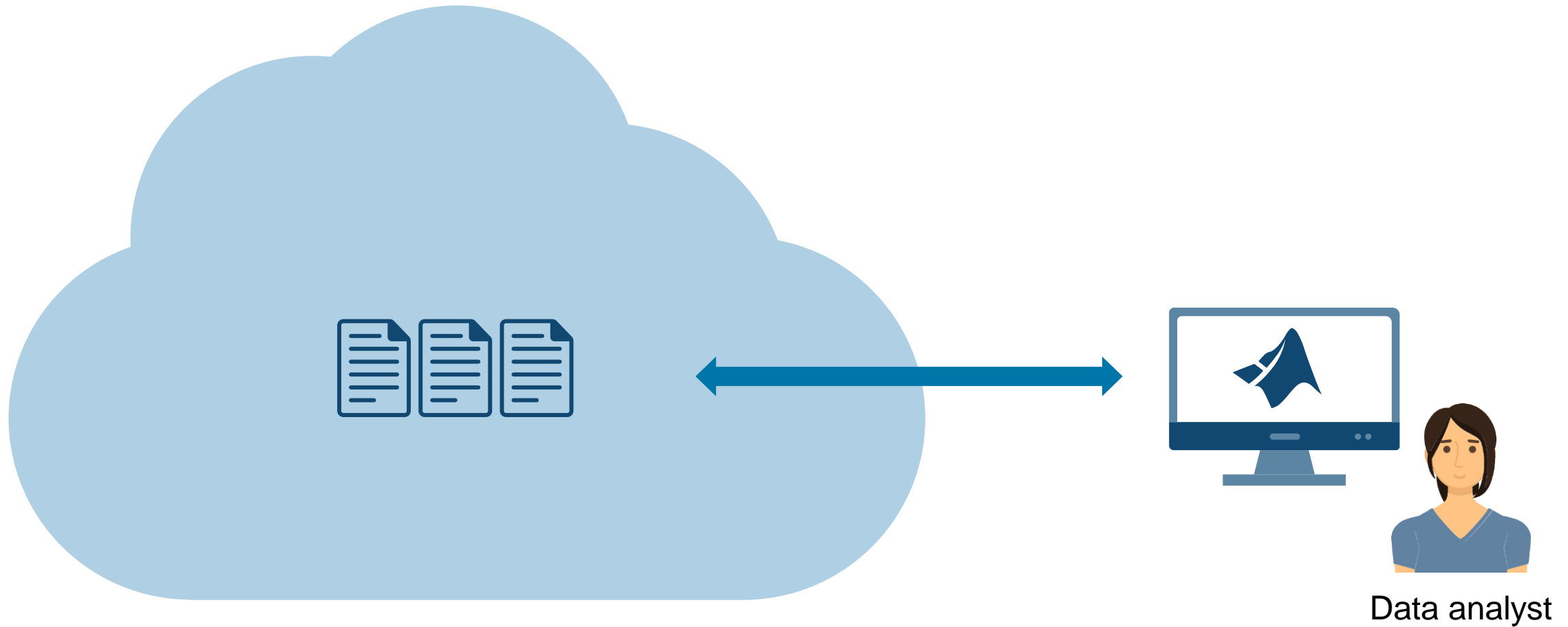
- Read data from the cloud
- Train an AI model in a cloud environment
- Deploy AI model to the cloud



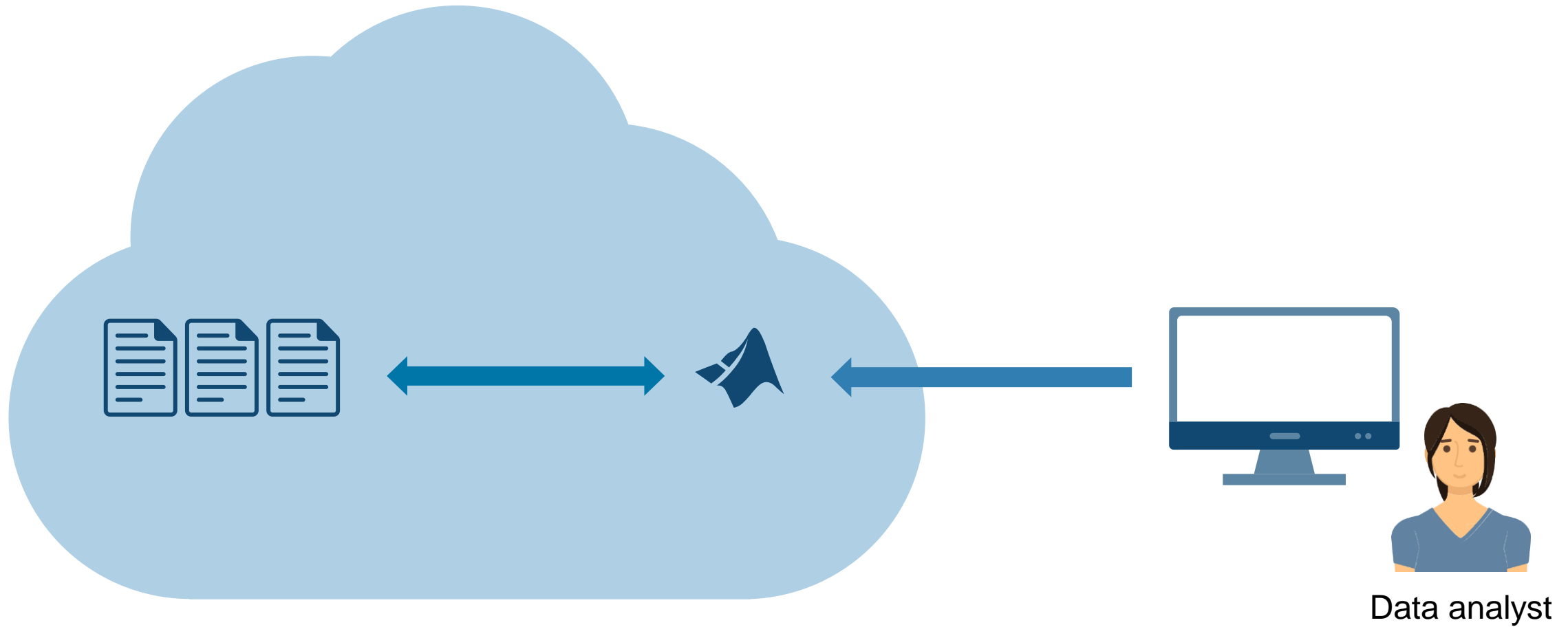
Source: <https://github.com/gsoh/VED>

G. Oh, D. J. Leblanc and H. Peng, "Vehicle Energy Dataset (VED), A Large-Scale Dataset for Vehicle Energy Consumption Research," in IEEE Transactions on Intelligent Transportation Systems, vol. 23, no. 4, pp. 3302-3312, April 2022, doi: 10.1109/TITS.2020.3035596.

Cloud Workflows



Cloud Workflows



The Cloud and MathWorks Products



Software as a service



Private cloud



Public cloud



Microsoft Azure

Reference architectures

Cloud Center



MATLAB Online
Simulink Online
MATLAB Drive

MathWorks server products

Containers

Cloud Resources | Cloud Accounts

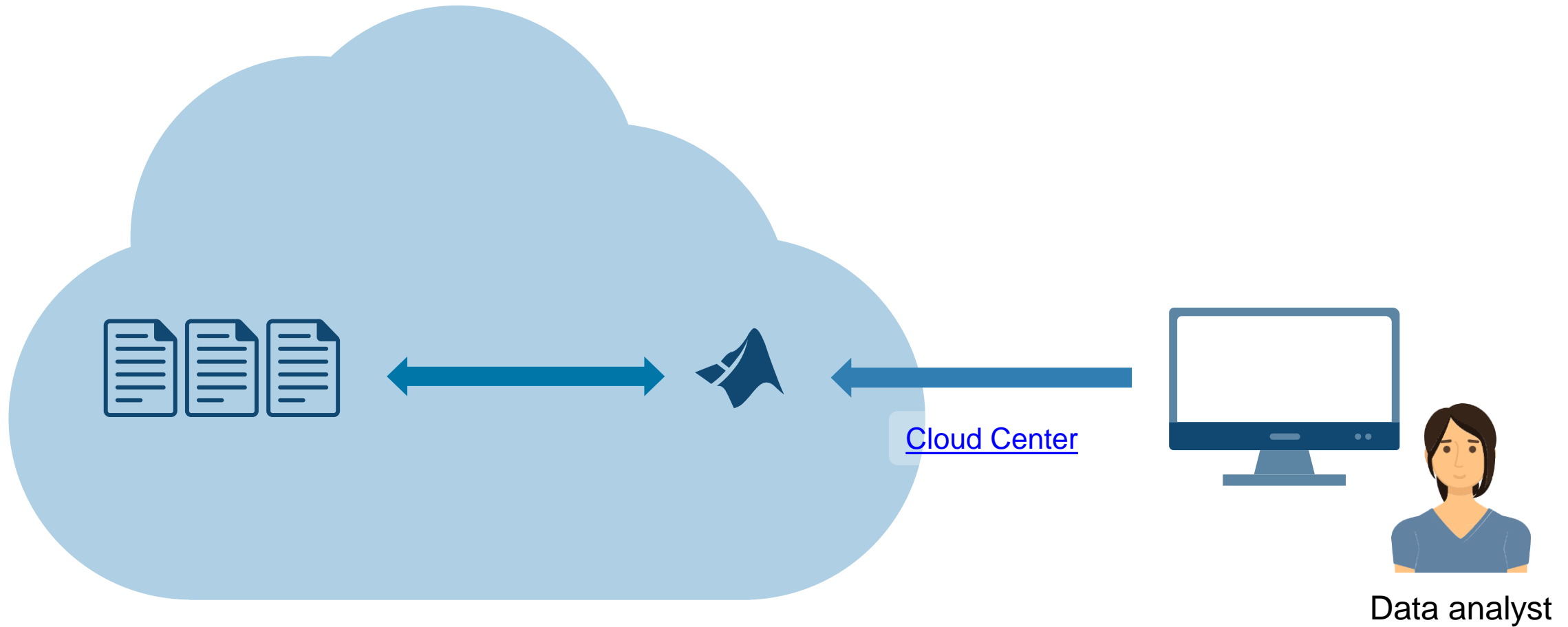
MATLAB [+ Create](#)

To start a new MATLAB cloud resource, click Create.

MATLAB Parallel Server [+ Create](#)

To start a new MATLAB Parallel Server cluster, click Create.

Cloud Workflows



HOME PLOTS APPS Try the New Desktop Search Documentation Amélie

New Script New Live Script New Open Compare Import Data Clean Data Variable Save Workspace Clear Workspace Favorites Analyze Code Run and Time Clear Commands Simulink Layout Set Path Parallel Add-Ons Help Community Request Support Learn MATLAB

FILE VARIABLE CODE SIMULINK ENVIRONMENT RESOURCES

C:\Users\Administrator\Documents\MATLAB

Current Folder

- Name
- FleetAnalytics

Command Window

```
>>
```

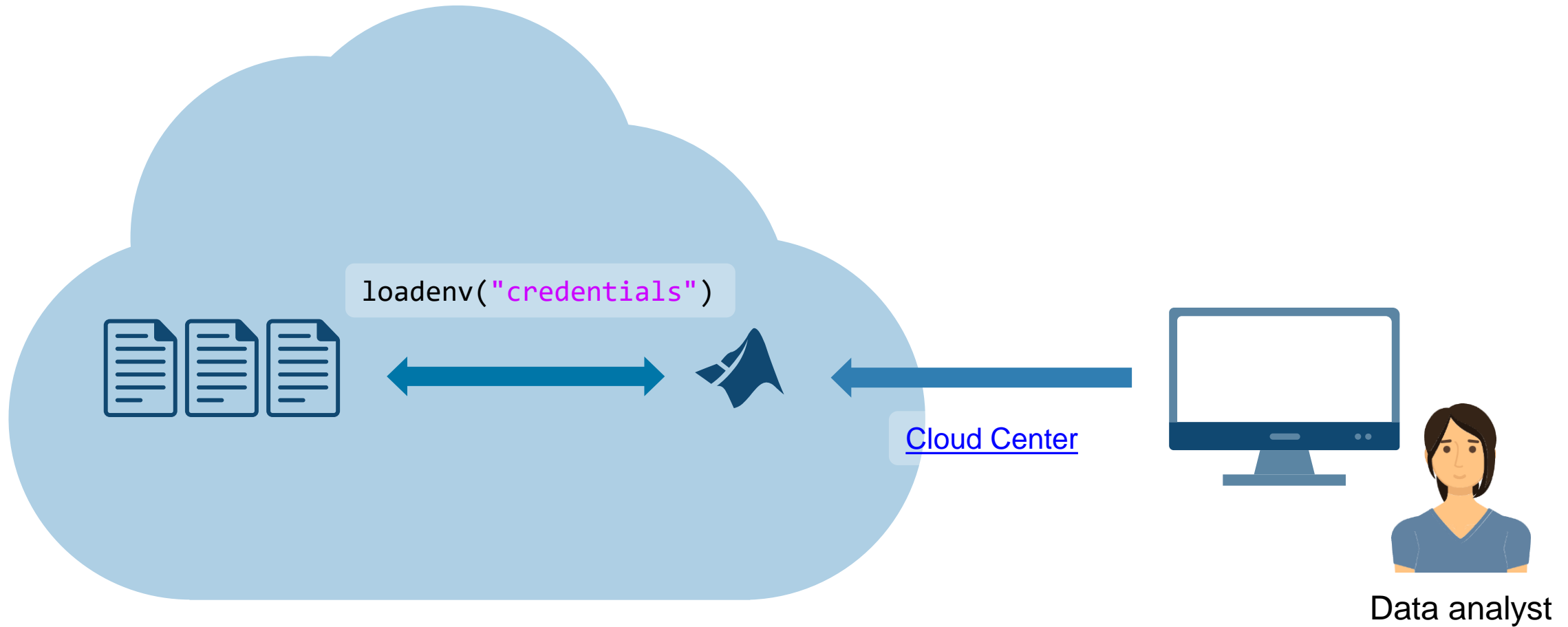
Workspace

Name	Value
------	-------

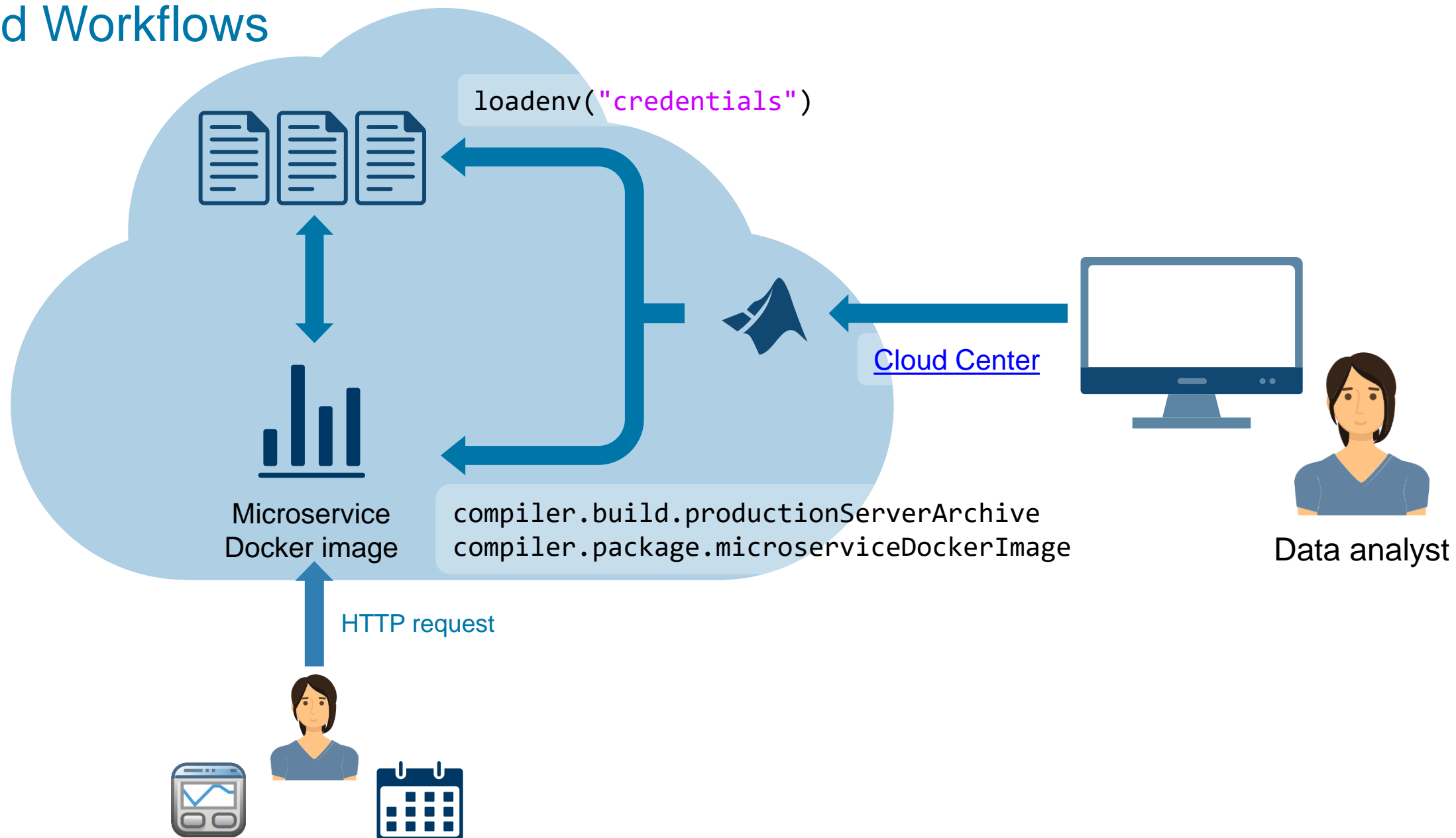
Details

Select a file to view details

Cloud Workflows



Cloud Workflows



Home >

MATLABEXPODemo

Resource group

Search | Create | Manage view | Delete resource group | Refresh | Export to CSV | Open query | Assign tags | Move | Delete | Export template | Open in mobile

Overview | Activity log | Access control (IAM) | Tags | Resource visualizer | Events | Settings | Cost Management | Cost analysis | Cost alerts (preview) | Budgets | Advisor recommendations | Monitoring | Automation | Help

Essentials

Subscription (move) : [Application Engineering UK](#) | Deployments : [8 Succeeded](#)
Subscription ID : 6a6ac00c-6277-44d1-9f30-a78ed75eb6c7 | Location : UK South
Tags (edit) : [Add tags](#)

Resources

Recommendations (6)

Filter for any field... | Type equals all | Location equals all | Add filter

Showing 1 to 3 of 3 records. Show hidden types

No grouping | List view

<input type="checkbox"/> Name ↑↓	Type ↑↓	Location ↑↓	
<input type="checkbox"/> matlabexpodata Data	Storage account	UK South	...
<input type="checkbox"/> tripefficiencyinstance Running microservice	Container instances	UK South	...
<input type="checkbox"/> tripefficiencyregistry Stored microservice	Container registry	UK South	...

Cloud Workflows



Data analyst

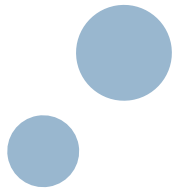


Large storage

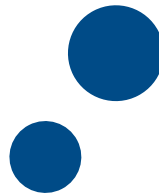
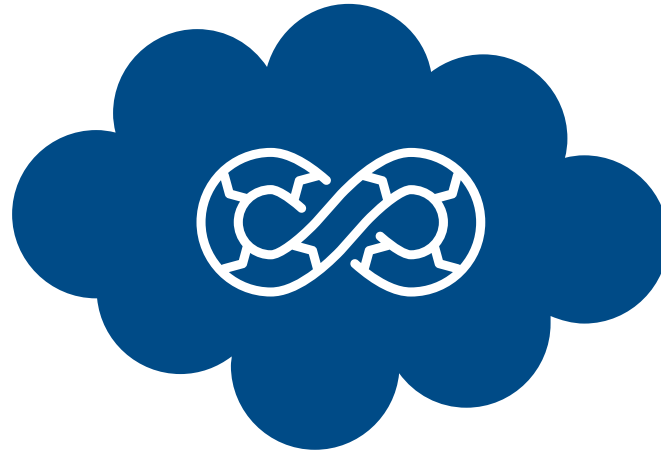
Powerful compute

Automation

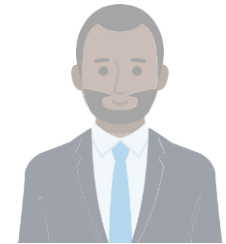
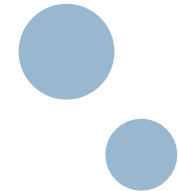
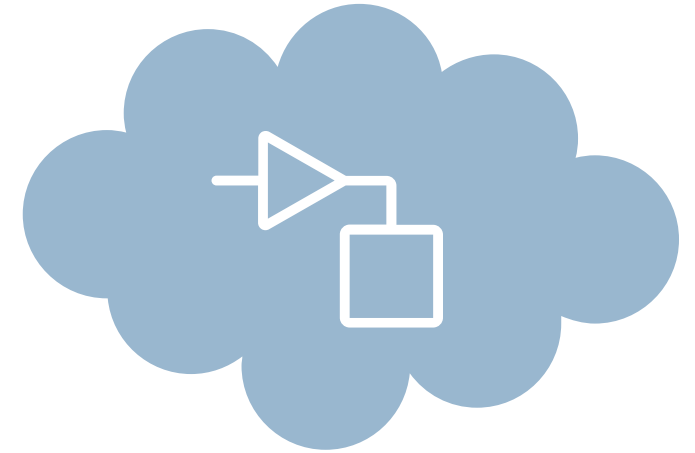
Why Should You Think about the Cloud?



Data analyst

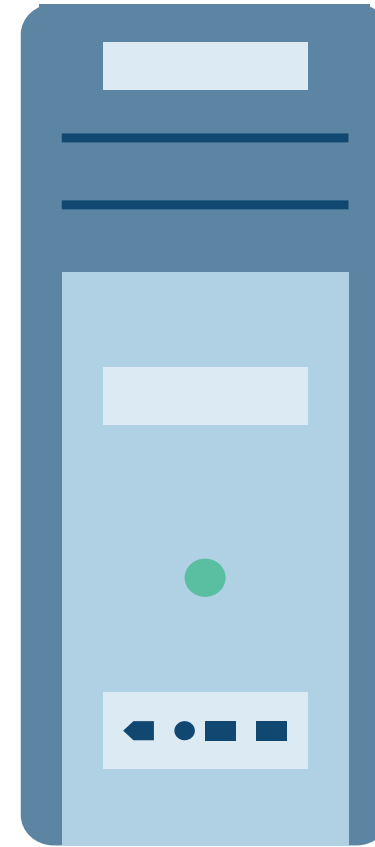
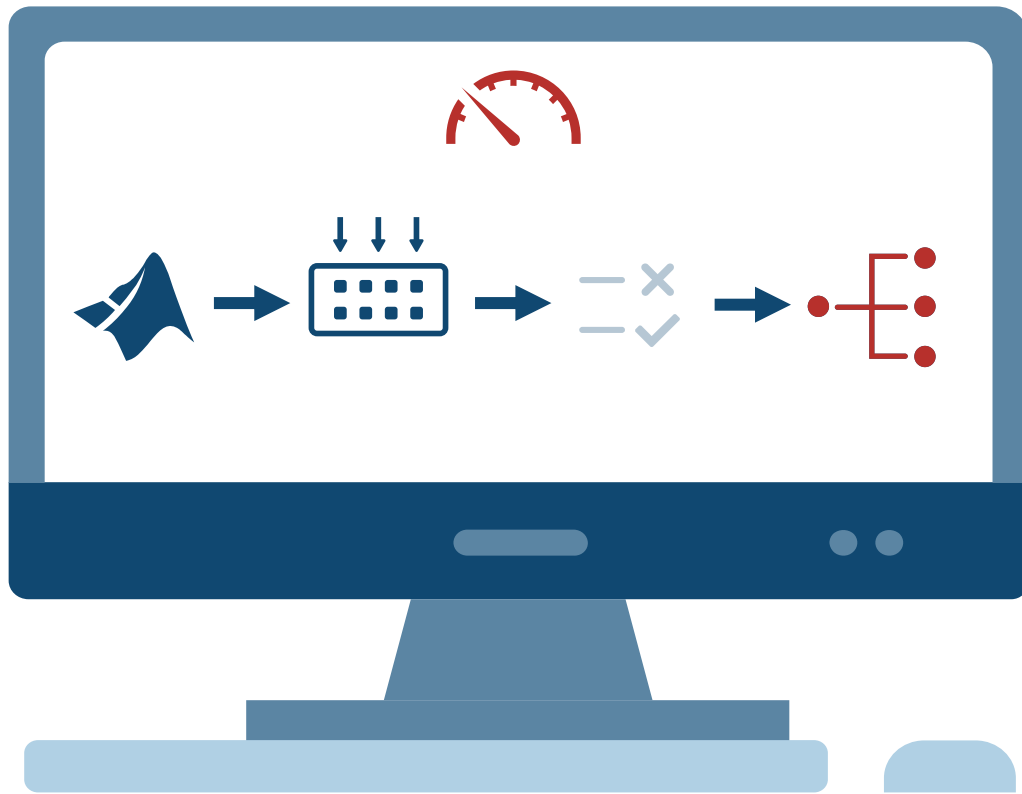


Test engineer



Simulation engineer

Current Workflows

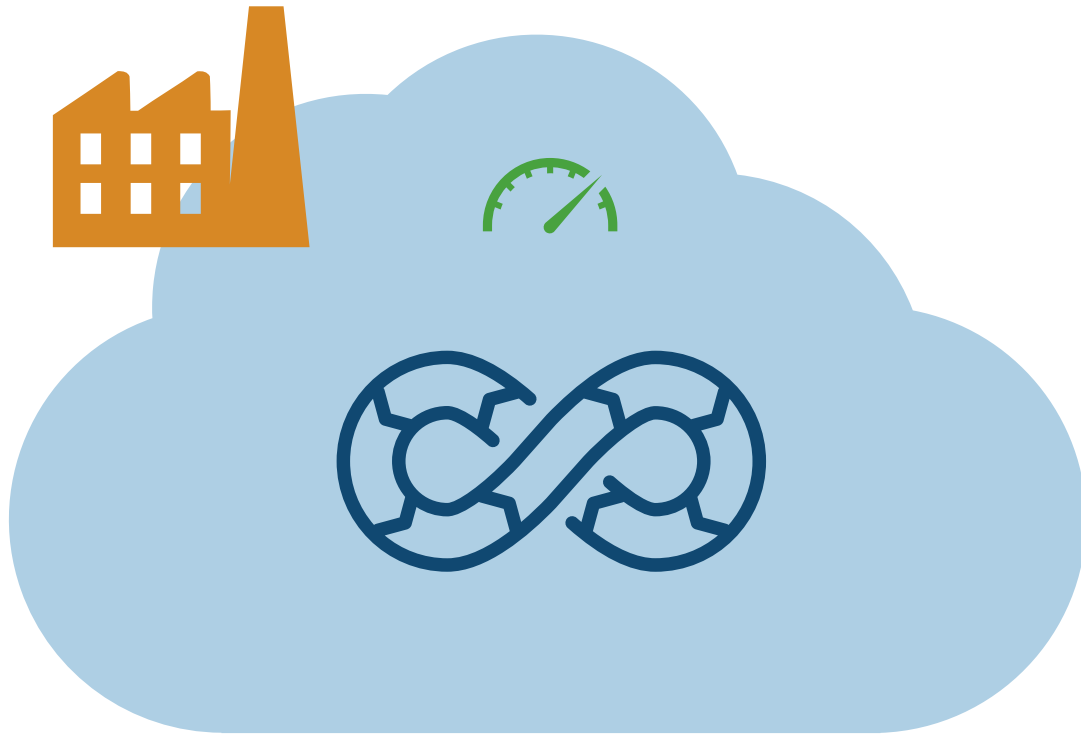


Error prone

Lack of consistency

Time consuming

Cloud Workflows



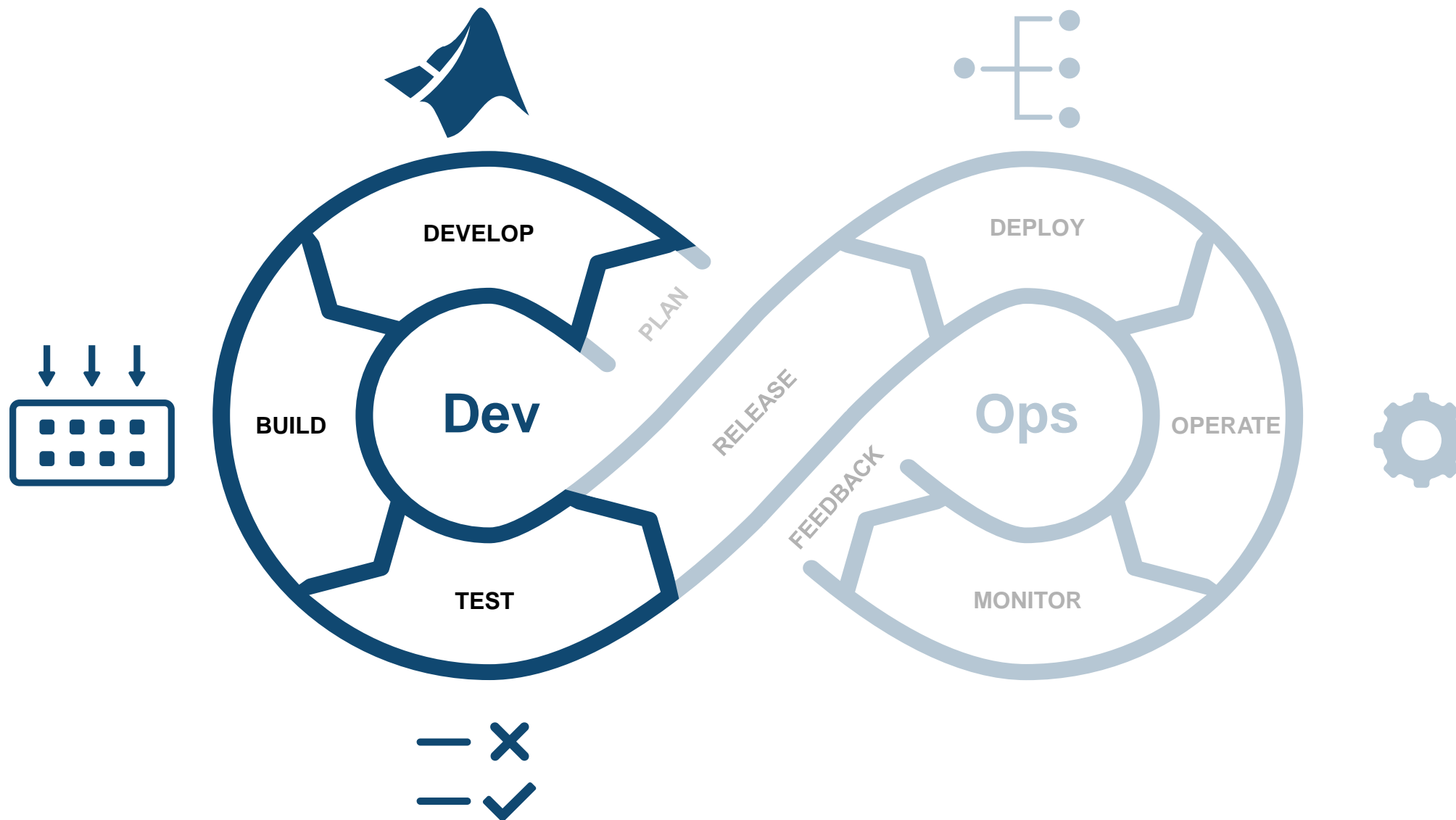
Automation

Consistency

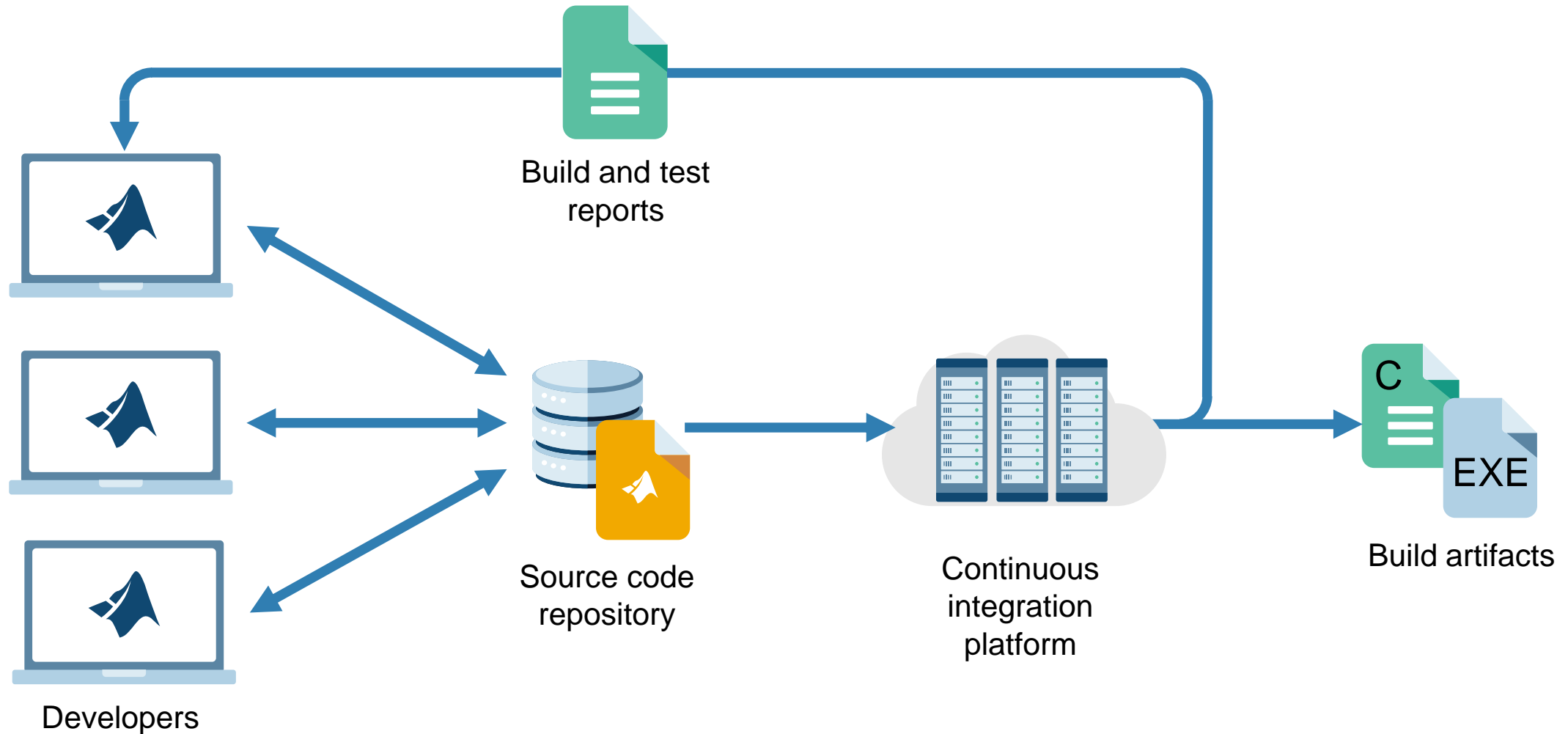
Traceability & reproducibility

Time efficient

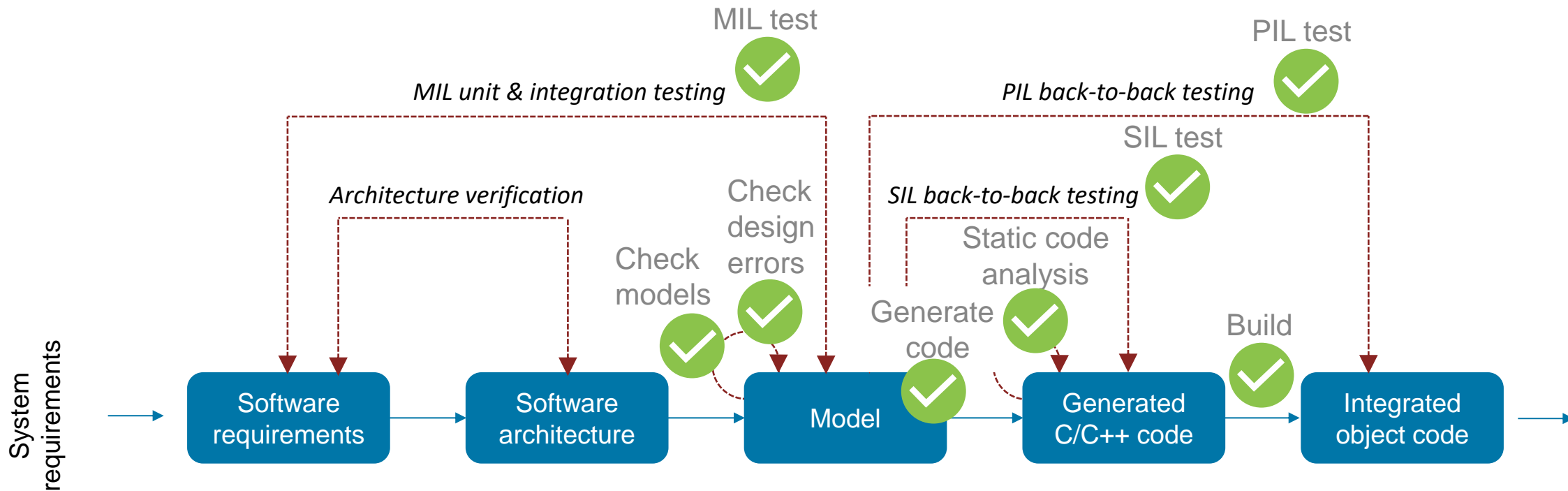
DevOps Lifecycle



CI-Based Workflow

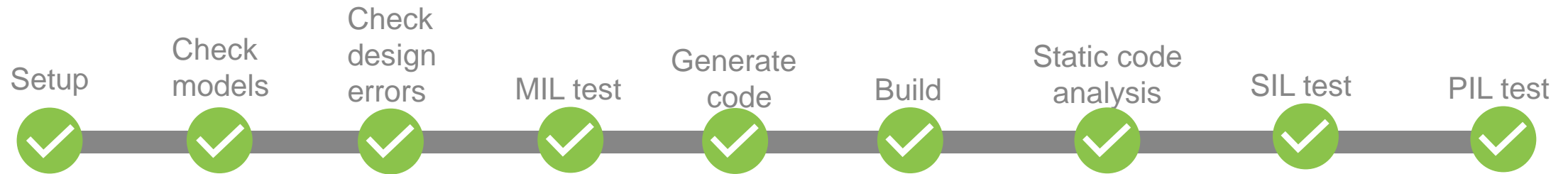


Model-Based Design Reference Workflow



- Identify tasks

Model-Based Design Reference Workflow



- Identify tasks
- Define sequence
- Define outputs
- Script the tools



build.m

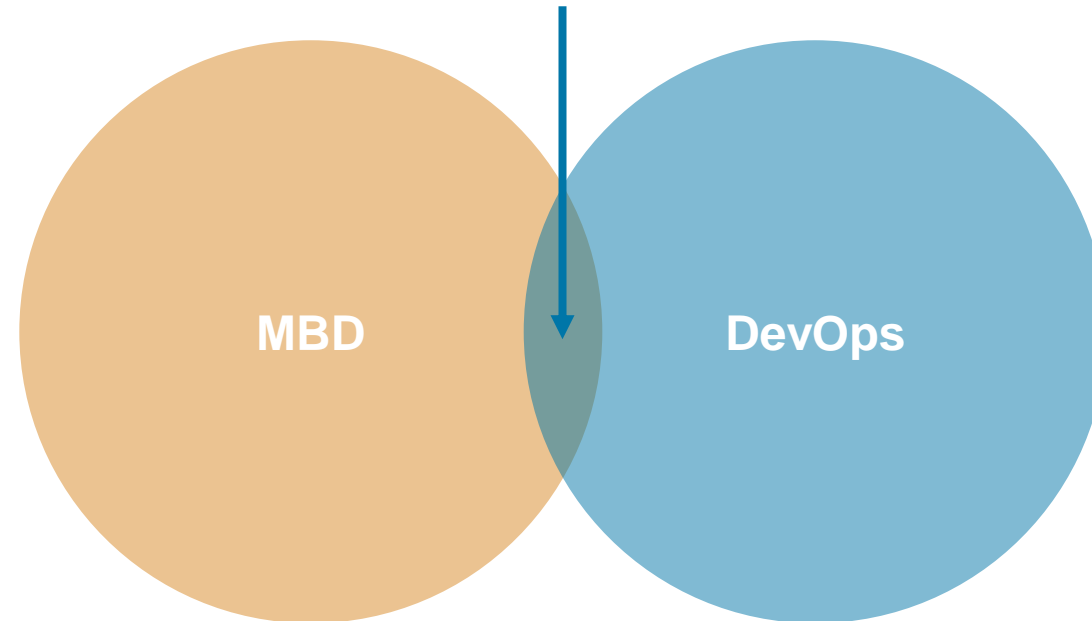


genCode.m



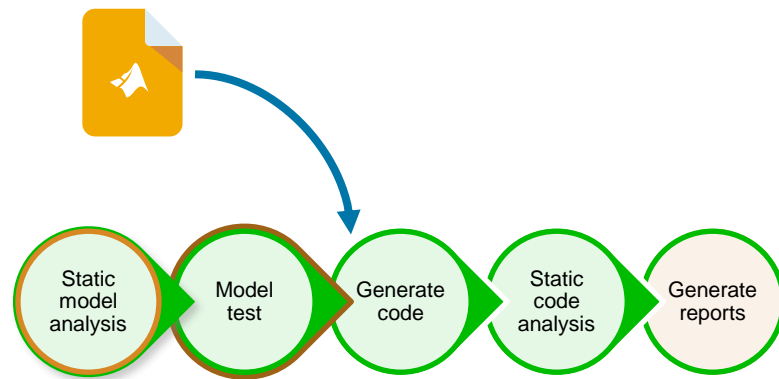
Continuous Integration and Model-Based Design

People who can set up MBD pipelines



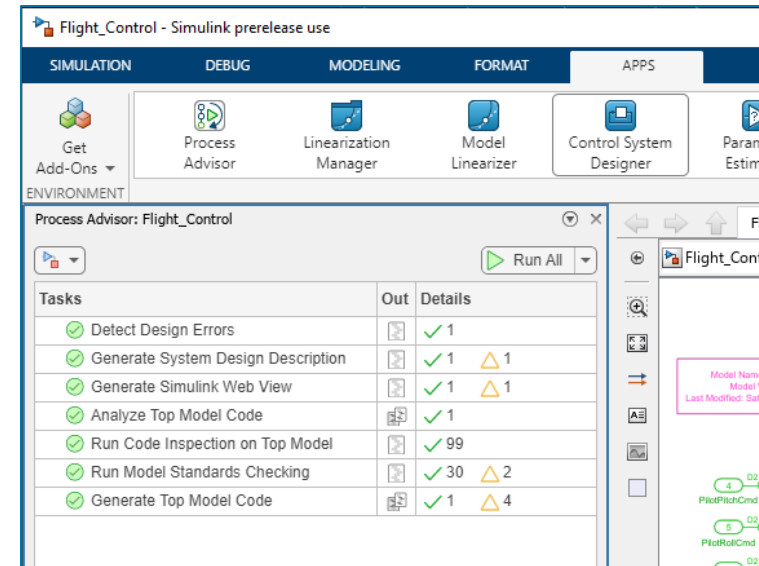
- Model pipeline in MATLAB
- Minimise DevOps interaction
- Autonomy of MBD users

Support Package: CI/CD Automation for Simulink Check



Pipeline setup

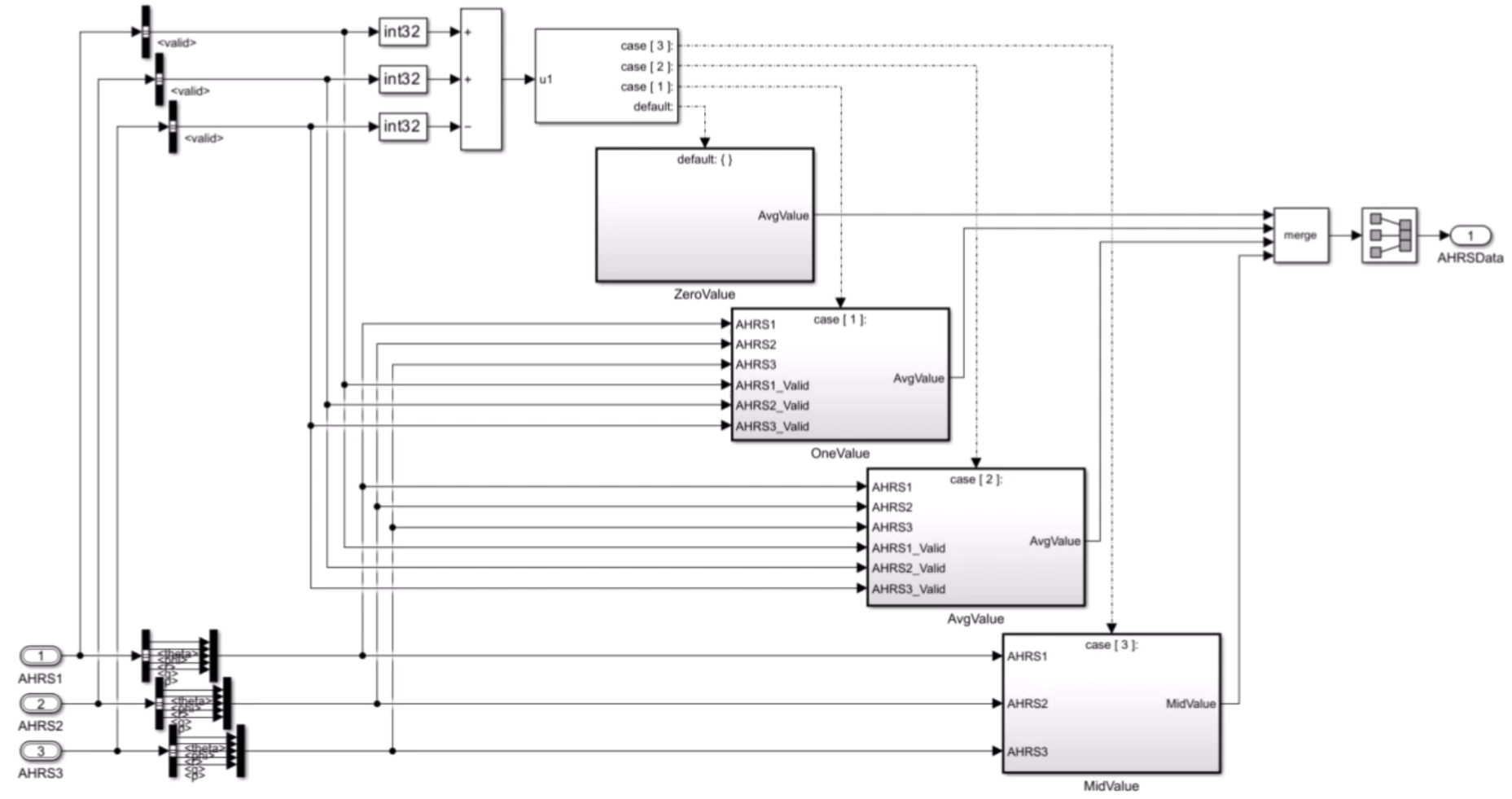
- Prebuilt MBD pipeline
- Built-in MBD tool support
- Tailorable



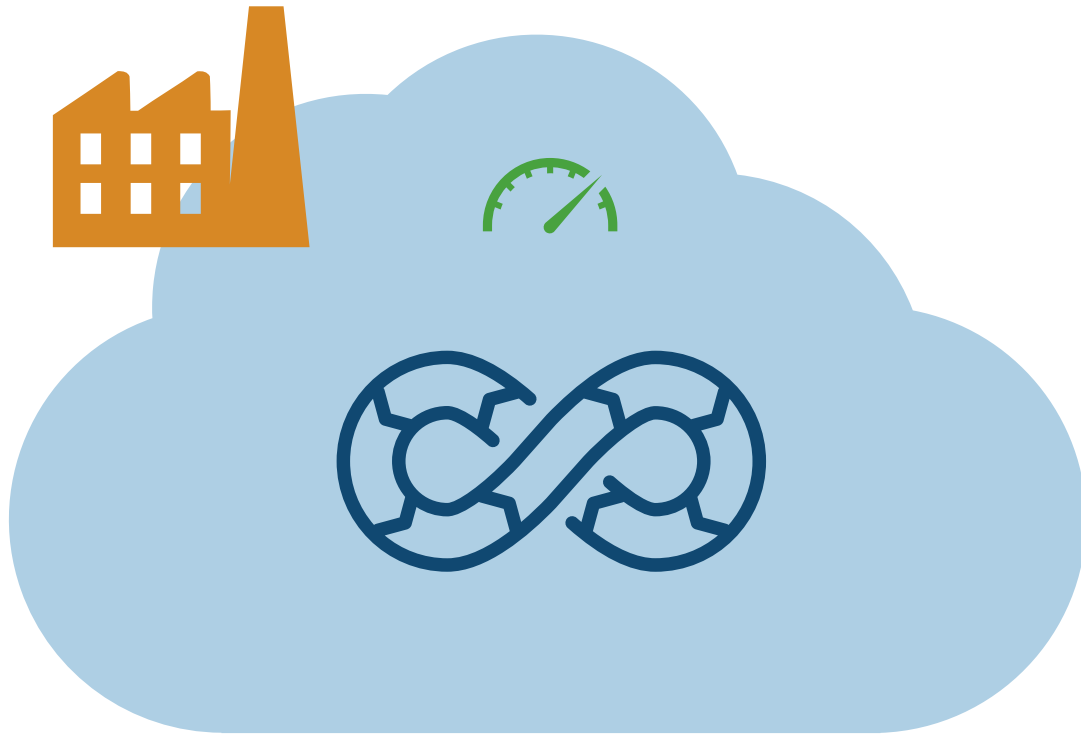
Process Advisor app

- Local testing
- Local debugging
- Local execution

Model Name: AHRS_Voter
 Model Version: 8.3
 Last Modified: Thu Sep 12 14:55:19 2024



Cloud Workflows



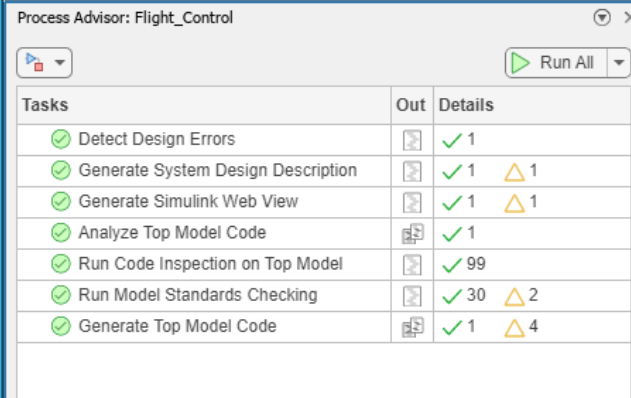
Automation

Consistency

Traceability & reproducibility

Time efficient

Cloud Workflows

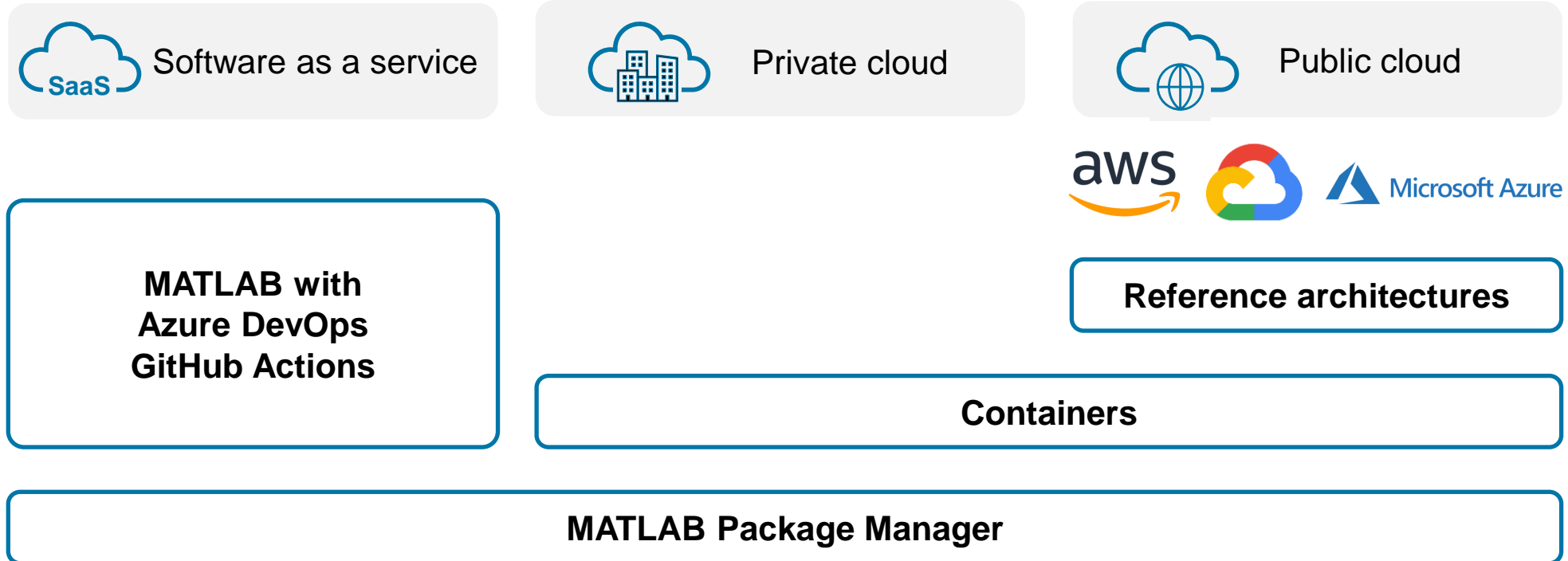


The screenshot shows a window titled "Process Advisor: Flight_Control" with a "Run All" button. Below the button is a table with three columns: "Tasks", "Out", and "Details". The table lists seven tasks, each with a green checkmark in the "Tasks" column, a status icon in the "Out" column, and a count of successes and warnings in the "Details" column.

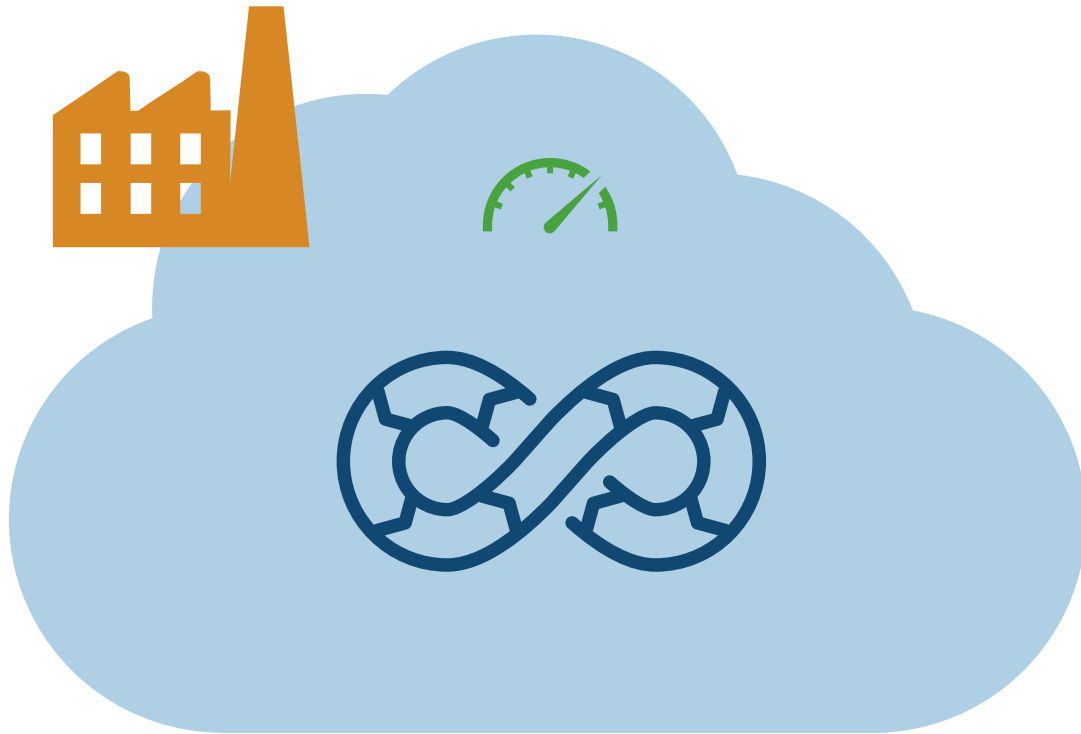
Tasks	Out	Details
✔ Detect Design Errors	☒	✔ 1
✔ Generate System Design Description	☒	✔ 1 ⚠ 1
✔ Generate Simulink Web View	☒	✔ 1 ⚠ 1
✔ Analyze Top Model Code	☒	✔ 1
✔ Run Code Inspection on Top Model	☒	✔ 99
✔ Run Model Standards Checking	☒	✔ 30 ⚠ 2
✔ Generate Top Model Code	☒	✔ 1 ⚠ 4

Continuous integration platform

MathWorks Tools on Continuous Integration Platform



Cloud Workflows



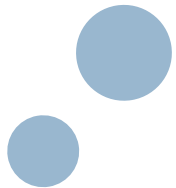
Automation

Consistency

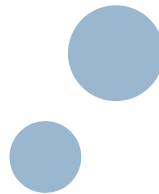
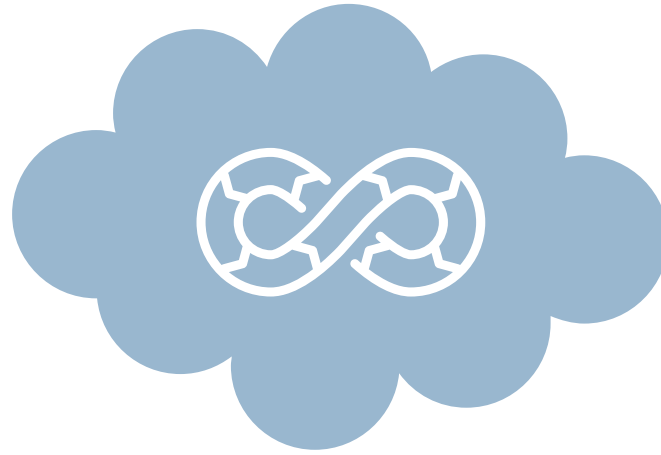
Traceability & reproducibility

Time efficient

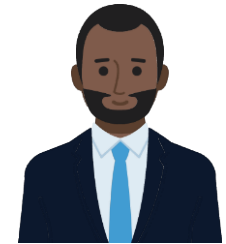
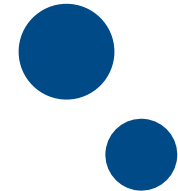
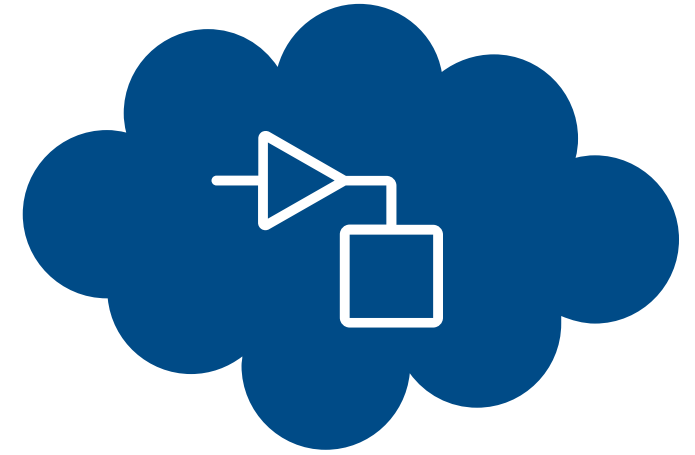
Why Should You Think about the Cloud?



Data analyst

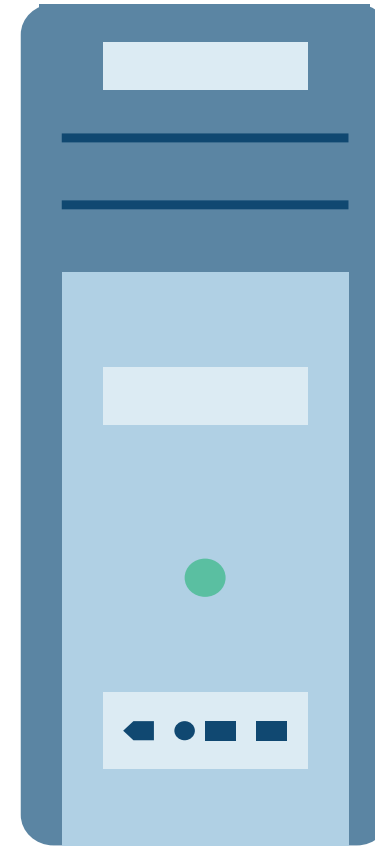
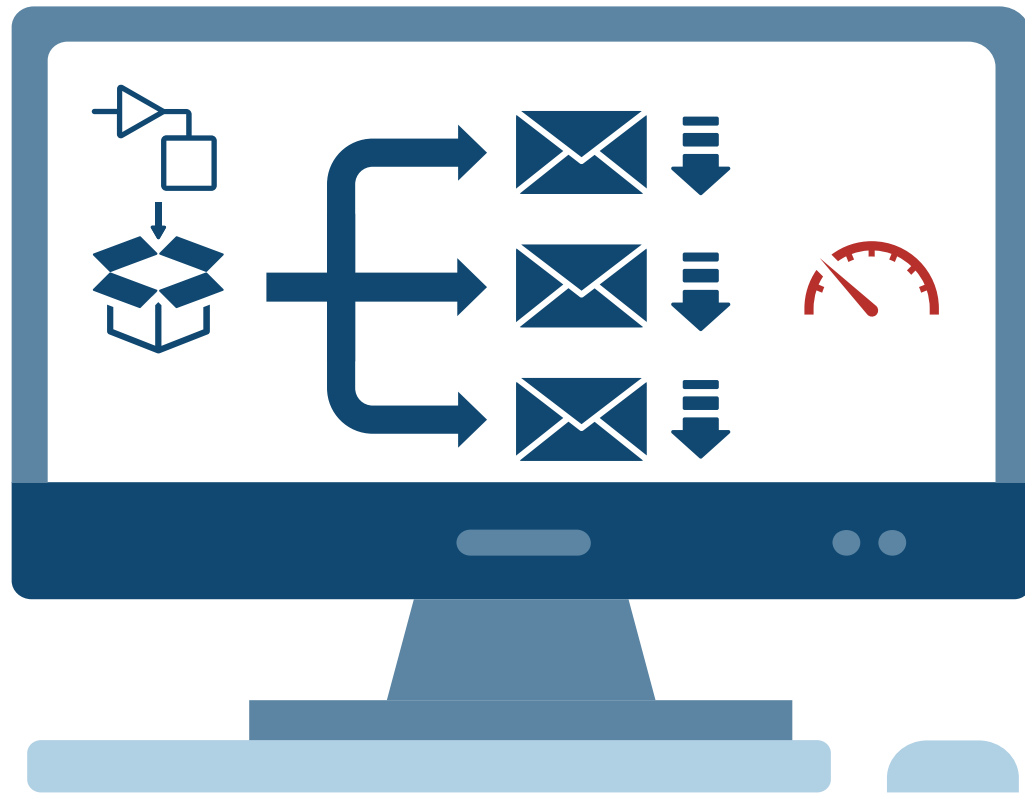


Test engineer



Simulation engineer

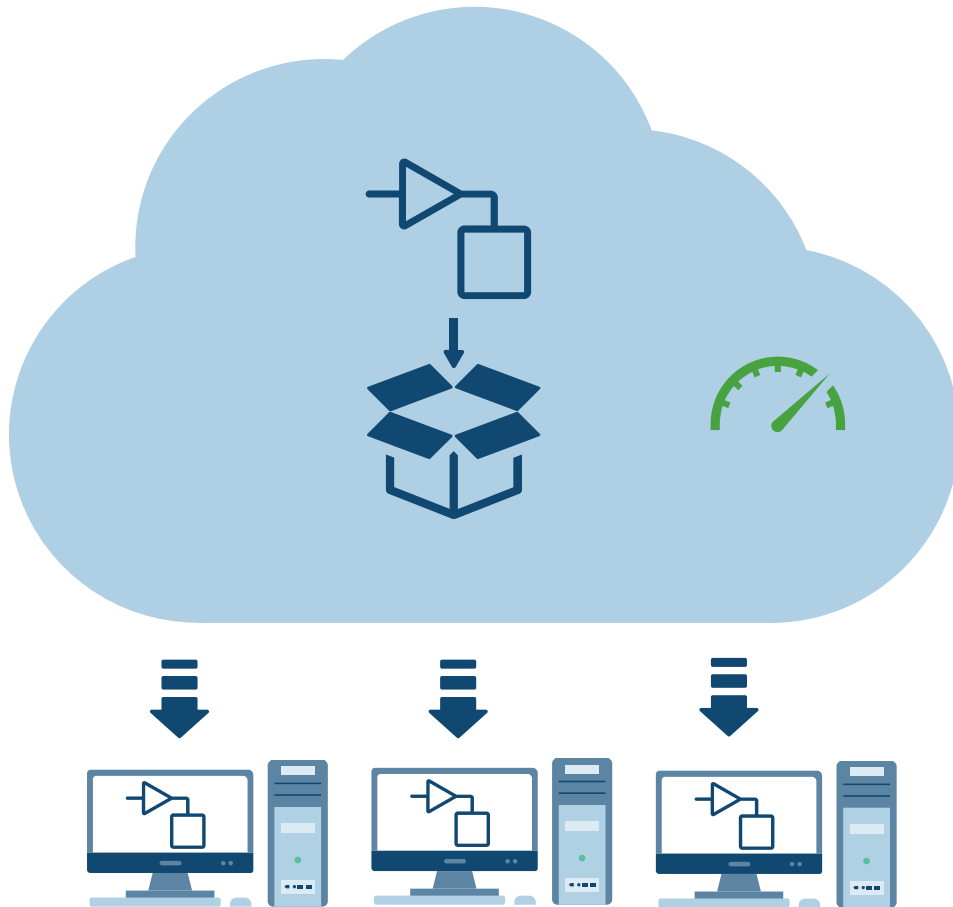
Current Workflows



Managing sharing

Slow simulations

Cloud Workflows



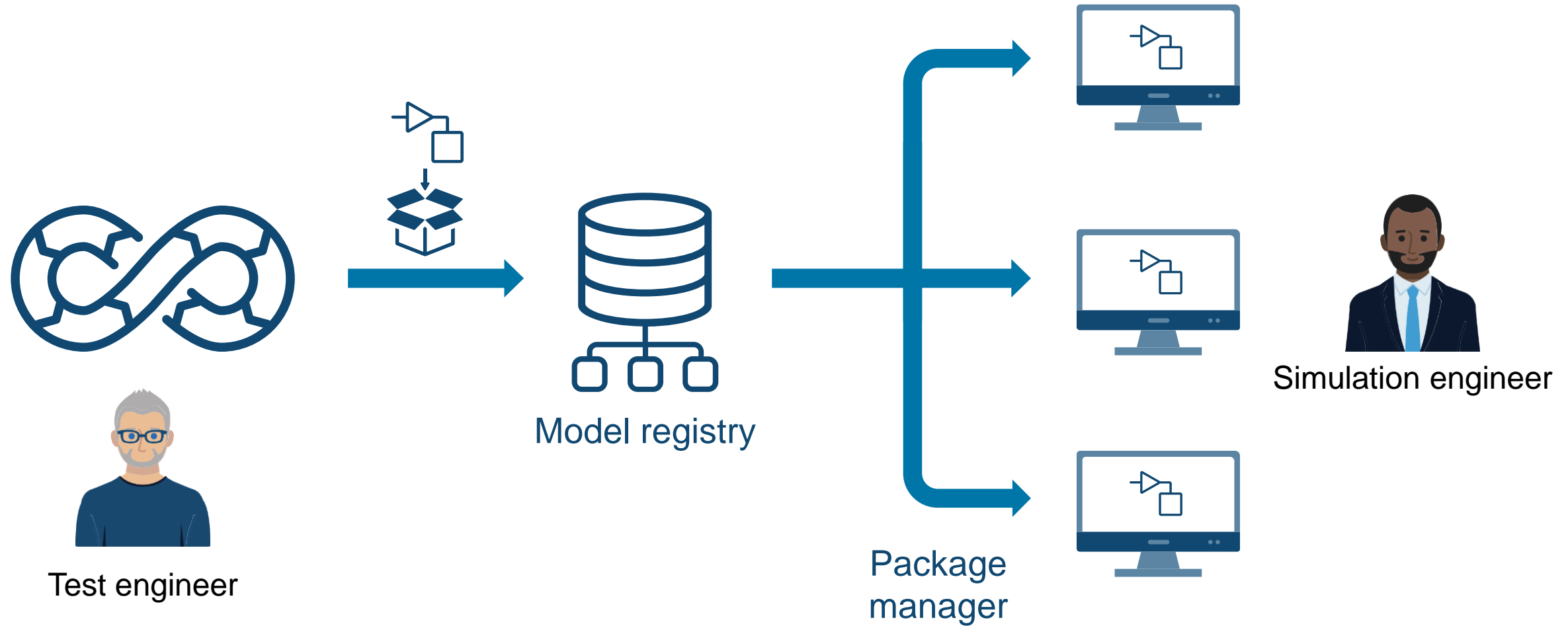
Easy sharing

Searchability

Speed-up simulations

Distributed simulations

Sharing – Package Registry



FILTER

Filter by Maintainer

Select maintainer ...

Filter by Authors

Select author ...

Filter by Tags

Select tags ...

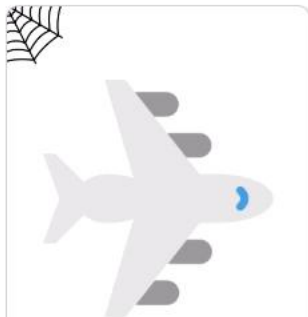
Filter by MATLAB Release

Select MATLAB Release ...

« < 1 2 3 > »
35 Results

Upload Addon

Sort by: Title ↑



Aeroplane Toolbox
by Darth Vader

Praesent condimentum diam
ut metus malesuada congue.



App Management Toolbox
by MathWorks

Toolbox for managing installed
apps and toolboxes from the
MATLAB Store




Asset Library Utilities
by Lachlan Jardine

Utility functions to connect
MathWorks tooling to the
Asset Library



Battery - Basic



Battery - System

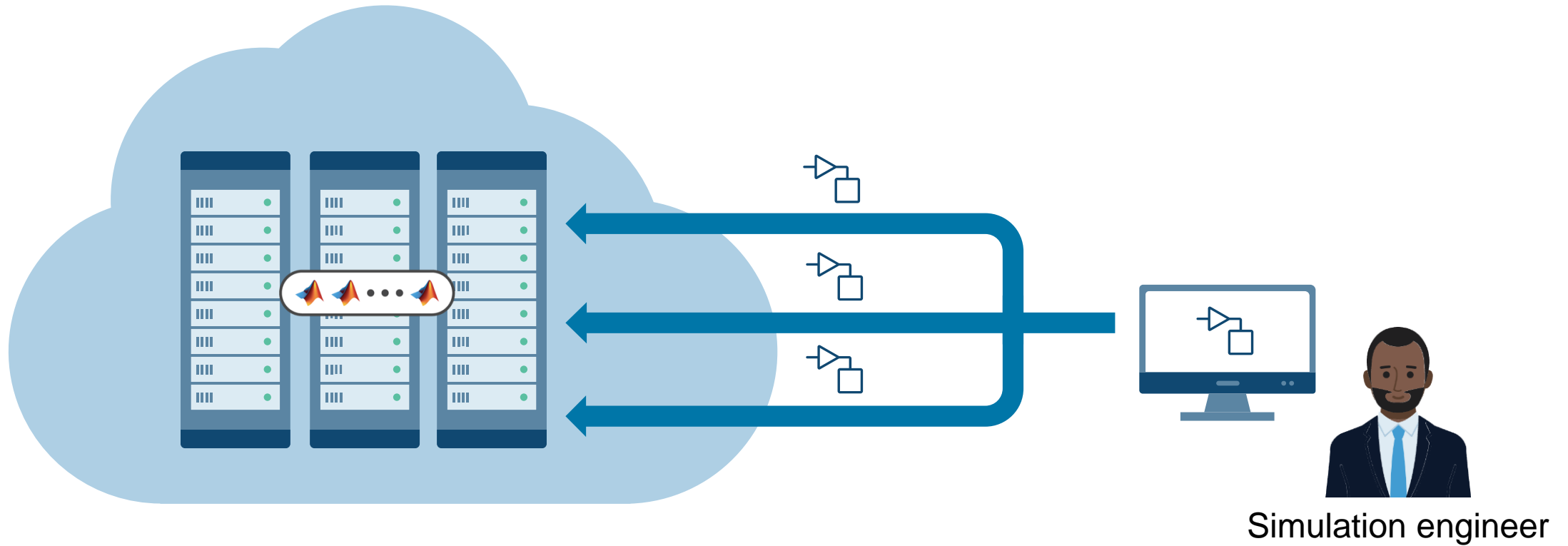


Battery - SystemSimple

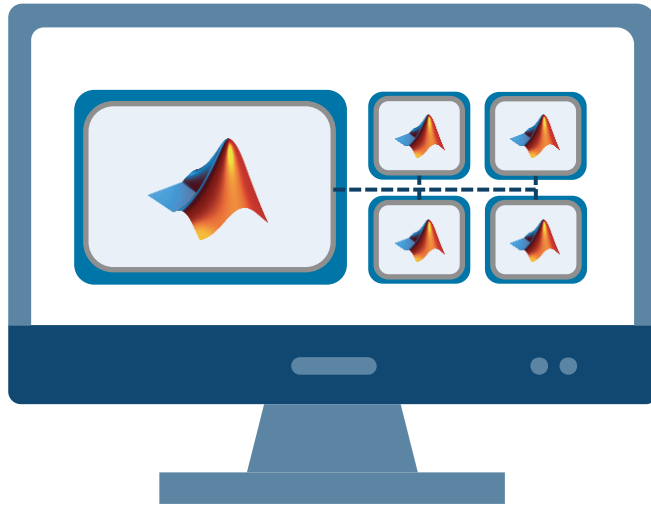


Download App Manager
Download

Speed Up Simulations



Parallel Computing Toolbox and MATLAB Parallel Server

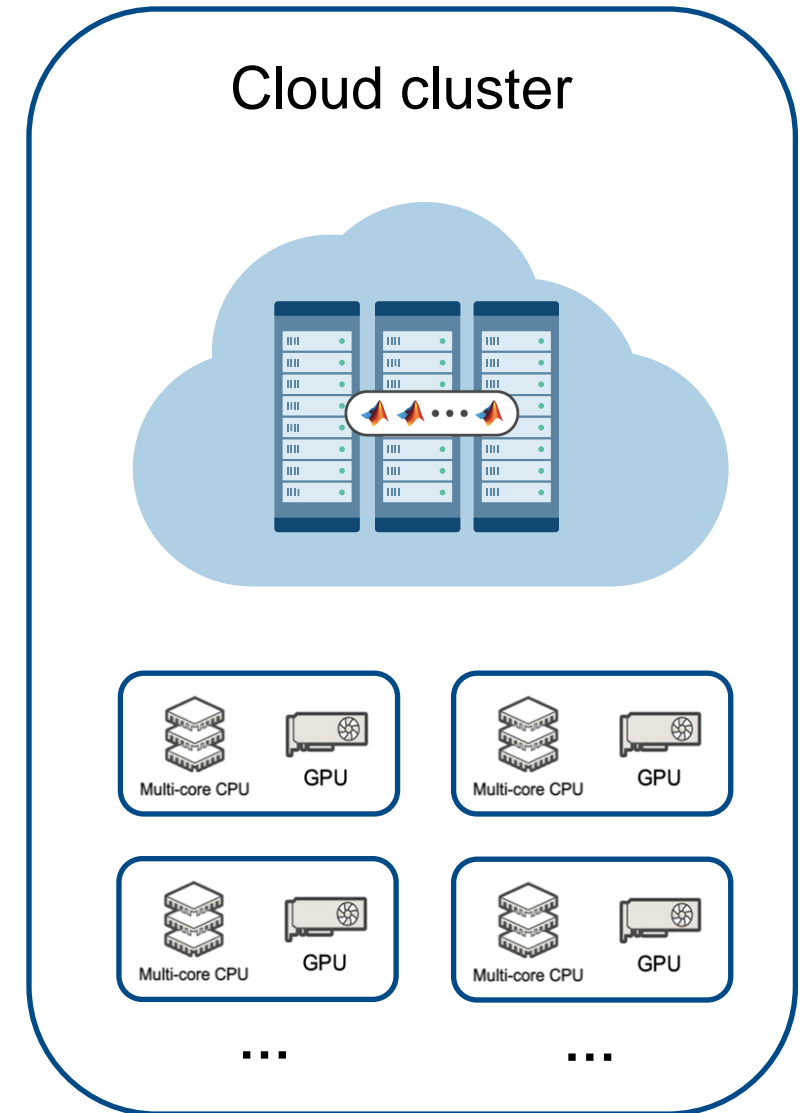


Parallel Computing
Toolbox



MATLAB Parallel
Server

Scale Up on the Cloud with MATLAB Parallel Server



Cloud Resources | Cloud Accounts

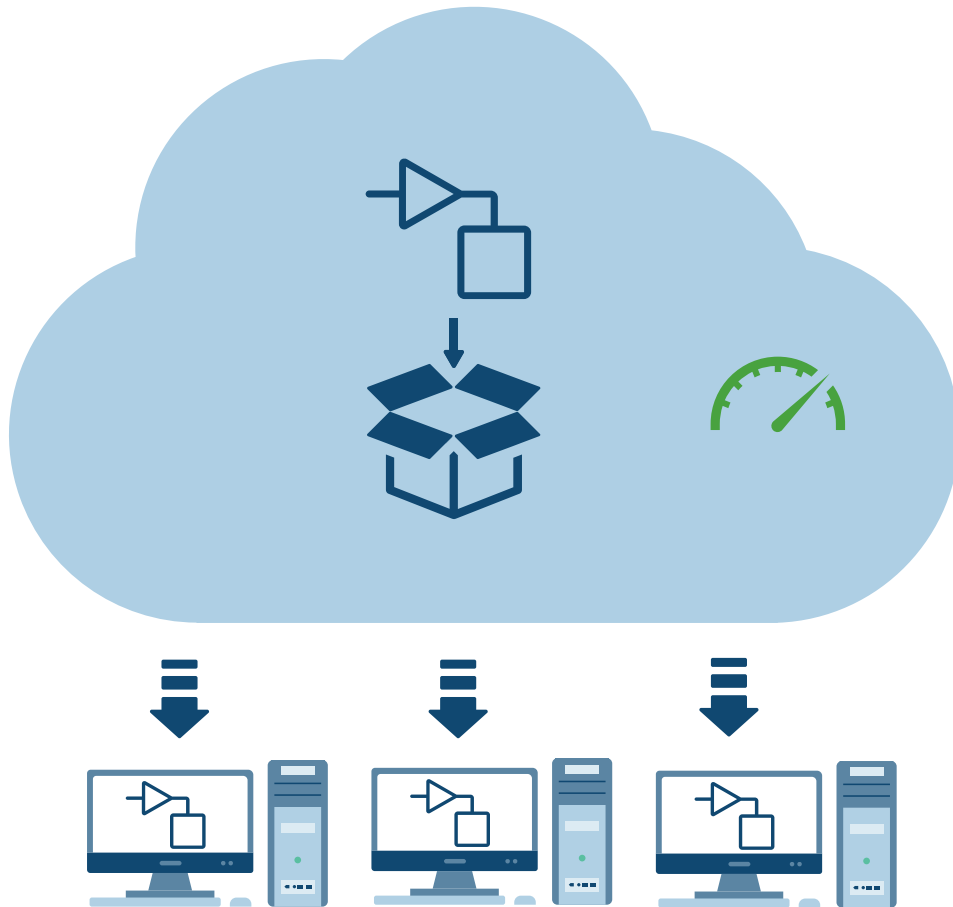
MATLAB [+ Create](#)

To start a new MATLAB cloud resource, click Create.

MATLAB Parallel Server [+ Create](#)

Name	Release	Operating System	Provider	Status
MyCloudCluster	R2024b	Linux	Amazon AWS	Ready

Cloud Workflows



Easy sharing

Searchability

Speed-up simulations

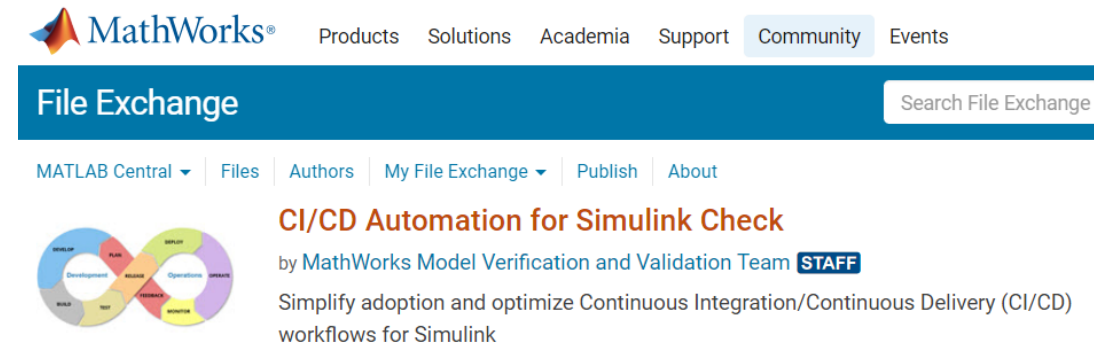
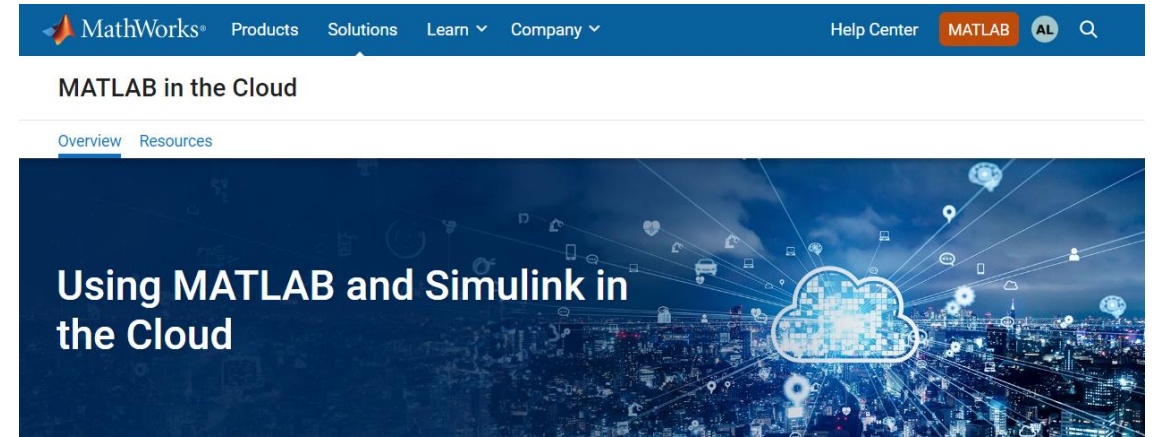
Distributed simulations

What Will Did You Learn Today?



Additional Resources

- Email
 - cloud@mathworks.com
 - continuous-integration@mathworks.com
- Web
 - [MATLAB in the Cloud](#)
 - [File Exchange](#)
 - [MathWorks Reference Architectures](#)
- Come and talk to us at the demo stations!



MATLAB EXPO

**Continue your experience:
Register for MATLAB EXPO 2024**

November 13–14, 2024 | Online

Further your connections, deepen your knowledge,
and enhance your skills.



Hands-On
Workshops



Technology
Showcase



What's
New



Register at
matlabexpo.com/online



MATLAB EXPO

 UNITED KINGDOM

Thank you!



© 2024 The MathWorks, Inc. MATLAB and Simulink are registered trademarks of The MathWorks, Inc. See [mathworks.com/trademarks](https://www.mathworks.com/trademarks) for a list of additional trademarks. Other product or brand names may be trademarks or registered trademarks of their respective holders.

